USDA
NATURAL RESOURCES
CONSERVATION SERVICE

MARYLAND CONSERVATION
PRACTICE STANDARD

HEAVY USE AREA PROTECTION

CODE 561
(Reported by Ac.)

DEFINITION

The stabilization of areas frequently and intensively used by people, animals or vehicles by establishing vegetative cover, by surfacing with suitable materials, and/or by installing needed structures.

PURPOSES

This practice may be applied as a part of a conservation management system to support one or more of the following purposes:

1. To reduce soil erosion;
2. To improve water quantity and quality;
3. To improve air quality;
4. To improve aesthetics;
5. To improve livestock health.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to urban, agricultural, and recreation areas or other frequently and intensely used areas that require special treatment to address one or more resource concerns.

This practice does not apply to protecting areas where other conservation practice standards are more applicable. For example, to establish vegetation on critically eroding areas, refer to the Maryland conservation practice standard for Critical Area Planting (Code 342). Refer to the conservation practice standard for Waste Storage Facility (Code 313) when stacking pads are needed for waste field storage.

CONSIDERATIONS

General

Consider the location of the site, distance, and gradient relative to streams, sinkholes, drainage ways, and wellheads; depth to bedrock; aquifer flow characteristics; traffic patterns and density; type of maintenance equipment; proximity to neighbors; prevailing winds; visual effects; and operation and maintenance costs.

For structural design measures, consider all items that will influence the performance of the structure, including loading assumptions, material properties, and construction quality.

Concentrated Livestock Areas

When using stone as a surface treatment, there are concerns that small stones of certain sizes may embed themselves into the animal's hooves or may cause abscesses. This concern exists when the heavy use area is frequently used and adjacent to a paved area, such as a concrete barnyard. For example, for dairy cattle, stone in the ¼ to ¾-inch range are of concern. When using stone as a surfacing material, considering using a surfacing stone gradation that does not include the stone size of concern. Discuss the options with the user, address concerns as appropriate. Base final decisions on the type of surface treatment to be used for the intended use, frequency of use, proximity to paved areas, concerns, and anticipated maintenance.

When evaluating areas adjacent to existing paved areas, consider the combined sizing of the existing paved area and the additional proposed paved area. The sizing limits should be a combination of both paved areas.

Improving Air Quality

Consider additional air quality conservation practices at the source and/or between the heavy use area and nearby sensitive areas.

Consider the following effects on water quantity and quantity during planning:

1. Effects on the water budget, especially on volumes and rates of runoff, infiltration, and transpiration;

2. Effects on erosion and the movement of sediment, animal waste, and soluble and sediment-attached substances carried by runoff;

3. Effects of changes in surface and ground water caused by introduction of fertilizers for vegetated areas, and oils and chemicals associated with concrete and asphalt placement and other construction activities;

4. Effects of changes in surface water quality and quantity caused by the surfacing of confined animal feeding areas.

If the purpose of the heavy use area protection is improvement of water quality, locate the area as far away from the waterbody or watercourse as possible. Heavy use protection areas should be kept as small as practical.

CRITERIA

General Criteria Applicable to All Purposes

Select the stabilizing material based on the intended use, desired maintenance frequency, and runoff control.

All planned work shall comply with Federal, state, and local laws and regulations.

Measures shall be taken to limit the generation of particulate matter during construction.

Safety of the users shall be incorporated into the design of the heavy use area protection.

Structural Design – Design all structures according to appropriate NRCS standards and specifications or Engineering Field Handbook recommendations. Show design assumptions and construction requirements on the plans.

If the heavy use area is to have a roof, snow and wind loads shall be as specified in ASAE EP288.5, Agricultural Building Snow and Wind Loads. If the heavy use area is to serve as part of a foundation or support for a building, use the total load in the structural design.

Materials - Personnel with appropriate NRCS engineering approval authority shall inspect all materials. Materials must conform to the following material specifications:

1. Concrete - Concrete must meet the minimum requirements of Maryland Department of Transportation, State Highway Administration, *Standard Specifications for Construction and Materials,* Section 902, Mix No. 3 (3,500 psi), Type IA cement. Other mixes may be used when design computations are completed;

2. Asphalt - Asphalt shall meet the requirements of Maryland Department of Transportation, State Highway Administration, *Standard Specifications for Construction and Materials,* Section 504. Choose a mix type appropriate for the surface application;

3. Rock - Gravel (aggregates) and rock riprap must meet the requirements of Maryland Department of Transportation, State Highway Administration, *Standard Specifications for Construction and Materials,* Sections 901.01 and 901.02 respectively or appropriate AASHTO Standards. Recycled concrete may be substituted if appropriately sized;

4. Geotextile - Geotextile may be woven or nonwoven and must meet the requirements of Maryland Department of Transportation, State Highway Administration, *Standard Specifications for Construction and Materials,* Section 921.09, Class SE.

Additional Criteria for Concentrated Livestock Areas

General - This practice is intended to be a planned component of a Comprehensive Nutrient Management Plan (CNMP) or a Waste Management Plan (WMP), which addresses all practices needed to improve water quality from areas being frequently and intensively utilized by livestock.

Make provisions to collect, store and/or treat manure accumulations and contaminated runoff. All planned work shall comply with federal, state and local laws and regulations.

Field Investigation – Make a full investigation of the topography of the site, soil conditions, farming operations, erosion, hydrology, water quality and degree and type of usage before a specific plan is prepared for the area.

Drainage and Erosion Control – Dispose of surface and subsurface drainage without causing erosion or other water quality problems.

Control surface runoff from upstream areas to minimize clean water flow onto the heavy use area by the use of diversions, grassed waterways, lined waterways, underground outlets, or roof runoff structures. Store contaminated runoff from the area in accordance with Maryland conservation practice standards for Waste Storage Facility, (Code 313), or treat runoff using the Maryland conservation practice standard for Wastewater Treatment Strip (Code 635).

Size – Size heavy use areas based on the following criteria in Table 1. Where other types of livestock are involved, consult appropriate literature, such as MidWest Plan Service, for sizing requirements.

Table 1 - Sizing Requirements for Concentrated Livestock Areas

Animal Type	Confined w/ Other Shelter Available [1/] (Sq. Ft./A.U.)	Total Confinement [2/] (Sq. Ft./ A.U.)	Feeding Area Only [3/] (Sq. Ft./ A.U.)
Cattle	40 - 60	95 - 135	40 - 60
Horses	60 - 80	80 - 120	60 - 80
Sheep	25 - 35	60 - 80	25 - 35
Swine	20 - 50	50 - 125	20 - 50

[1/] Confined feeding area with separate shelter available.

[2/] Animals are totally confined without access to pasture or shelter.

[3/] Animals are on the heavy use area for feeding only and have free access to pasture.

Surface Treatment – The type of material is to be planned consistent with loading, uses and exposure of the area using one of the following materials:

1. Concrete – Use a minimum thickness of 5 inches. Reinforce with minimum 6"x 6"- 6/6 gage welded wire mesh. Use a 5-inch base course of gravel, crushed stone, or other suitable materials. The existing subgrade may be used if it is adequately drained. Use geotextile for soil separation when foundation is soft or poorly drained;

2. Asphalt – Use a minimum thickness of 4 inches with a mixture appropriate for surface application. Use a 5-inch base course of gravel, crushed stone, or other suitable materials. The existing subgrade may be used if it is adequately drained. Use geotextile for soil separation when foundation is soft or poorly drained;

3. Gravel (for dairy cattle) – Surface shall consist of placement of 6 inches of AASHTO M43, No. 4 stone (¾ to 1½-inch) with a minimum 3-inch surface layer of fine stone dust or sand with a maximum particle size less than ¼-inch. Other surface layer materials, such as fly ash, shingle tab waste, tanbark, sawdust, etc., may be used. Use geotextile, unless foundation soils are firm and well drained;

4. Gravel (for other livestock) – Surface shall consist of placement of 6 inches of AASHTO M43, No. 2 stone (1½ to 2½-inch) with a minimum 1-inch surface layer of MSHA CR-6 or stone dust. Other surface layer materials, such as cinders, fly ash, shingle waste, asphalt millings, tanbark, sawdust, etc., may be used. Use geotextile, unless foundation soils are firm and well drained;

5. Other materials – Where other surfacing materials such as fly ash, asphalt millings, etc. are used, the minimum thickness is 6 inches. Use geotextile, unless foundation soils are firm and well drained.

Fencing – Provide fencing as needed for livestock containment and direction, and exclusion of animals from adjacent Wastewater Treatment Strips. Follow the Maryland conservation practice standard for Fence (Code 382).

Additional Criteria for Grass Loafing Areas for Livestock

Where disturbed loafing areas are being improved for water quality purposes, the following criteria are applicable:

1. Establish a minimum of three grassed loafing paddocks and a sacrifice area;

2. The grassed loafing paddocks are to be sized at no smaller than one acre per twenty cows;

3. Establish an unpaved sacrifice area sized at 750 sq. ft./animal unit;

4. Avoid slopes that are less than 3% or greater than 8%;

5. Seed grassed loafing paddocks in accordance with Maryland conservation practice standard for Critical Area Planting (Code 342). To avoid livestock health problems due to endophyte toxicity, use a low endophyte variety of tall fescue when possible.

6. Fence cattle from all streams and concentrated flow areas such as drainage ways and sinkholes;

7. Provide livestock with a water supply that protects water quality;

8. Provide field filter strips between grassed loafing paddocks, streams, and drainageways in accordance with Maryland conservation practice standard for Filter Strip (Code 393). For sacrifice areas, provide treatment in accordance with the Maryland conservation practice standard for Wastewater Treatment Strip (Code 635). Otherwise, divert the polluted runoff into waste storage, constructed wetlands, or any combination of these and other practices that will provide effective treatment of contaminants;

9. Develop an operation and maintenance plan that addresses field rotation, use of sacrifice areas, fencing patterns, access roads, water sources, etc.

Additional Criteria for Livestock Travel Lanes and Watering Areas

Surface Drainage - Divert clean surface water away from these areas, to the fullest extent practical, to a safe and stable outlet.

Slope travel lanes and watering areas where practical for good drainage. Divert polluted runoff from travel lanes and watering areas onto a grass filter area with a minimum length of 20 feet. Construct travel lanes on the contour where possible to provide a sheet flow discharge. When constructing travel lanes on the contour is not practical, use concrete or asphalt waterbars spaced at regular intervals (50 feet maximum).

Surface Treatment – Select the surface material based on the type of livestock, desired maintenance frequency, and runoff control. Concrete and asphalt provide the most maintenance free surface. Where possible, avoid paving areas on slopes greater than 8%.

Follow the surface treatment criteria shown in the section of this standard, Concentrated Livestock Areas.

Fencing – Provide fencing as needed for livestock containment and direction, and exclusion of animals from adjacent Wastewater Treatment Strips. Follow the Maryland conservation practice standard for Fence (Code 382).

Additional Criteria for Other Types of Heavy Use Areas

General - This practice is intended to stabilize intensively used areas such as roadways, trails and parking lots.

Drainage and Erosion Control – Make provisions for surface and subsurface drainage, as needed, and for disposal of runoff without causing erosion.

Surface Treatment – Design areas that support vehicular traffic for a wheel load of at least 4,000 pounds. The type of surface treatment shall be selected based on the intensity of use, type and level of maintenance that will be provided. Use one of the following materials:

1. Asphalt - The thickness of the asphalt course, the kind and size of aggregate, type and pro-

portioning of bituminous materials, and the mixing and placing of these materials shall be in accordance with good highway practice for the expected loading and in accordance with sound engineering practice;

2. Concrete - The quality and thickness of concrete and the spacing and size of reinforcing steel shall be appropriate for the expected loading and in accordance with sound engineering practice;

3. Gravel – The minimum thickness is 2 inches;

4. Other materials - Where other surfacing materials such as cinders, tanbark, sawdust, etc. are used, the minimum thickness is 2 inches;

5. Sprays and artificial mulches - Sprays of asphalt, oil, plastic, manufactured mulches and similar materials will be installed in accordance with the manufacturer recommendations.

Provide a 5-inch base course of gravel, crushed stone, or other suitable materials under all asphalt and concrete areas. The material in place may be used if it has adequate drainage and bearing capacity. Use geotextile for soil separation if necessary.

SPECIFICATIONS

Specifications for Heavy Use Area Protection shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

1. Carry out construction operations in a manner such that erosion, air, and water pollution will be minimized and held within legal limits;

2. Complete required smoothing, grading, or leveling prior to the start of surfacing operations. Compact the subgrade as necessary to attain a firm foundation for the surfacing materials;

3. Hot bituminous surfacing materials shall not be placed on a wet subgrade;

4. All components of the completed structure shall comply with cross-sections, lines, grades, dimensions, and material specifications shown on the plans;

5. Steel reinforcement shall be formed, located, spliced, and lapped as specified on the construction drawings;

6. Backfill material shall be granular and compacted by a minimum of four complete passes of a sheepsfoot, rubber tired or vibratory roller. Fill material shall contain sufficient moisture such that the required degree of compaction will be obtained with the equipment used. Place to a height or elevations, lines, and slopes as shown on the construction plans;

7. All areas disturbed by the construction will be stabilized immediately after construction as required on the construction plans and in accordance with Maryland Conservation Practice Standard for Critical Area Planting (Code 342).

OPERATION AND MAINTENANCE

Prepare a written O&M Plan containing a minimum of the following information, as applicable:

1. Inspect the Heavy Use Area at least twice a year;

2. Scrape the surface as needed to remove excess manure and/or sediment;

3. Repair paved areas by repairing holes and replacement of paving materials.

4. Replace loose surfacing material such as gravel, cinders, sawdust, tanbark etc as needed when removed by livestock or equipment traffic or by scraping;

5. Repair any deteriorating areas;

6. Maintain all vegetation that is part of the plan by fertilization and liming according to soil test recommendations and reseeding or replanting as necessary;

7. Inspect inlets and outlets of pipes and culverts and remove any obstructions present;

8. Maintain flow into filter areas by removing accumulated solids, reconstructing waterbars, etc.

SUPPORTING DATA AND DOCUMENTATION

Field Data and Survey Notes

Record the following minimum information on survey note sheets, SCS- ENG-28 and 29 or appropriate engineering paper.

1. Plan view sketch of area surveyed with dimensions as appropriate;

2. Profiles, cross sections, and topographic survey of the area;

3. Soils investigation documenting soil texture, depth to seasonal high water table, depth to bedrock and permeability of the soil;

4. Drainage area delineation;

5. Documentation of discussions/decisions made with operator/owner.

Design Data

Record the following minimum information on appropriate engineering paper. For guidance on the preparation of engineering plans, see Chapter 5 of the Engineering Field Handbook.

1. Comprehensive Nutrient Management Plan or Waste Management Plan, as appropriate, when animals are involved;

2. Profiles and cross sections of the area showing grades and thickness of the base course and surface treatment, as appropriate;

3. Description of surface treatment (with material description);

4. Runoff treatment design;

5. Area grading plan;

6. Construction specifications and notes;

7. Seeding plan meeting requirements of Maryland conservation practice standard, Critical Area Planting (Code 342);

8. Quantities estimate;

9. Written O & M plan.

Construction Check Data/As-Built

1. Document site visits on CPA-6. Include the date, name of recorder, specifics about discussions, inspections, activities, personnel onsite and decisions made;

2. Installation and construction check notes are to be recorded in sufficient detail to show that the practice meets this standard and applicable specification. Minimum requirements are:

   a. Measurements to show length, width, and grades of completed heavy use area protection marked in red on the “as-built” plans;

   b. Statement as to the materials installed and thickness, to be placed on the “as-built” plans;

   c. Statement on seeding installation.

3. If appropriate state/local authorities approve urban erosion and sediment control plans, no additional documentation is necessary;

4. Include statement on survey notes and plans that "Construction meets or exceeds plans and NRCS practice standards." Statement to be signed and dated by a person with appropriate engineering job approval authority for construction;

5. Final quantities and documentation for quantity changes;

6. Materials certification documentation.

REFERENCES

1. Maryland Department of the Environment, Water Management Administration, *1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control*.

2. Maryland Department of Transportation, State Highway Administration, *Standard Specifications for Construction and Materials*, Baltimore, Maryland, January 2001.

3. MidWest Plan Service, *MWPS Publications,* http://www.mwpshq.org/

4. USDA, Natural Resources Conservation Service, *Maryland Field Office Technical Guide, Section IV, Standards and Specifications.*

5. USDA, Natural Resources Conservation Service, *National Engineering Handbook, Part 650.*

6. USDA, Natural Resources Conservation Service, *National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook.*

7. USDA, Natural Resources Conservation Service, *National Engineering Manual.*

8. USDA, Natural Resources Conservation Service, *National Handbook of Conservation Practices.*